MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

31 May 2016
2:30 p.m. – 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages with **FIVE** questions.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.
4. **No calculators are allowed**.

No calculators are allowed.
You are required to write proper steps.

ANSWER ALL QUESTIONS.

QUESTION 1 [10 marks]

(a) Simplify the expression and write your final expression as a fraction with no negative exponents.

$$\frac{3x^5y^{-3}}{(2x^3y)^3}$$ (2 marks)

(b) Rationalize the denominator and simplify.

$$\frac{6}{\sqrt{11}-3}$$ (2 marks)

(c) Perform the indicated operation and write the final result in the standard form $a+bi$.

$$\frac{3-i}{2+i}$$ (2 marks)

(d) Factor the polynomial.

$$8x^3-27$$ (2 marks)

(e) Simplify the expression and give the final answer as a single fraction.

$$\frac{5}{(x+2)(x-3)}-\frac{6}{(x+2)^2}$$ (2 marks)

Continued .....

QUESTION 2 [10 marks]

(a) (i) Solve the quadratic equation $2x^2 + 9x + 7 = 18$.

(ii) Solve the inequality $2x^2 + 9x - 11 < 0$.
Give your final answer in interval notation.

(iii) Find the domain of the function $g(x) = \sqrt{2x^2 + 9x - 11}$
Give your final answer in interval notation.

(5 marks)

(b) Solve the equation $|2x - 3| = 4$.

(2 marks)

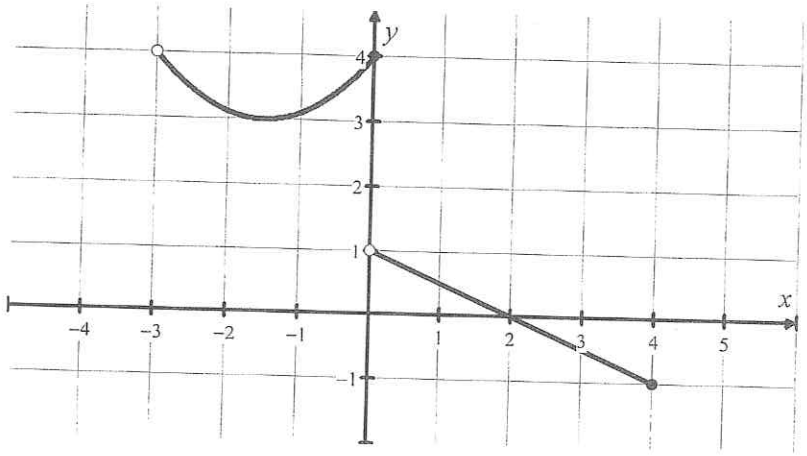
(c) Solve the equation $1 - x = \sqrt{3x + 1}$. Remember to check your answers.

(3 marks)

Continued .....

QUESTION 3 [10 marks]

(a) The figure shows the graph of a function.
(*The axes are marked off in one-unit intervals.*)



(i) State the domain and the range of the function in interval notation.

(ii) State whether it is a one-to-one function.

(2 marks)

(b) Given the functions $f(x)=\sqrt{x+3}$ and $g(x)=\dfrac{1}{4x^2+12}$, find

(i) $(f\circ g)(1)$, giving your final answer in the form $\dfrac{m}{n}$ where m and n are integers.

(ii) $f^{-1}(x)$, as a polynomial in x.

(3 marks)

(c) Consider the polynomial function $f(x)=(x+2)^2(x-2)(2x-5)$.

(i) What is the **degree** of f?

(ii) Find **the zeros** of f **and their multiplicities**.

At each zero, determine whether the graph of f crosses or touches the x-axis.

(iii) Find the y-intercept of the graph of f.

(iv) Determine the end behavior of f.

(v) Sketch the graph of the polynomial function.

Make sure your graph shows all intercepts and exhibits the proper end behavior.

(5 marks)

Continued .....

QUESTION 4 [10 marks]

(a) Use long division to find the quotient and the remainder when the polynomial $6x^3 + 5x^2 - 2x + 1$ is divided by $x^2 + 2$.
You are required to state clearly what the quotient and the remainder are. (3 marks)

(b) Express the following expression as a single natural number. Show proper steps.

$$2\log_{10} 5 - \log_{10} 9 + \log_{10} 36$$

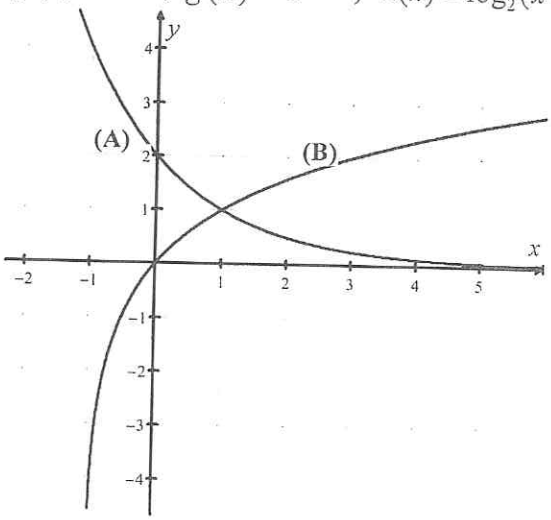
(2 marks)

(c) Solve the following equation: $3^{x-1} = 7$.
Express your answer in terms of logarithm to the base 10.
Don't approximate with a calculator. [No calculator is needed.] (2 marks)

(d) The graph of an exponential function $f(x) = Ae^{x+1} - 3$ passes through the point $(-1, -1)$.
Find the value of A.
(1 mark)

(e) The figure below shows the graphs of two functions selected from the list:

$f(x) = 2^{-x+1}$, $g(x) = 2^{x+1}$, $h(x) = \log_2(x+1)$, $p(x) = \log_2(x-1)$



(i) Write down the function whose graph is labelled (A).

(ii) Write down the function whose graph is labelled (B).

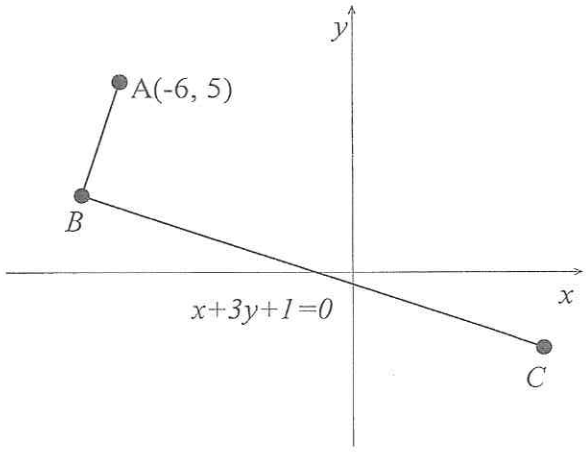
(2 marks)

Continued .....

QUESTION 5 [10 marks]

(a)

The diagram on the right shows a line segment AB perpendicular to line segment BC. An equation of the straight line passing through B and C is $x+3y+1=0$



Find

(i) the slope of BC,

(ii) the slope of AB and an equation of the straight line passing through A and B,

(iii) the coordinates of point B.

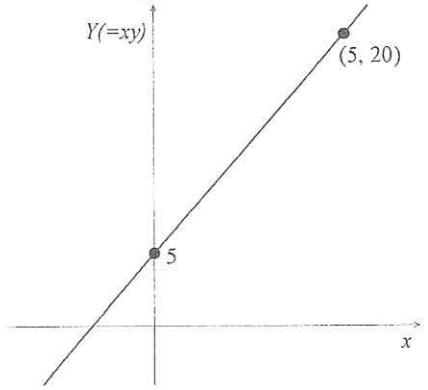
(5 marks)

(b) $P(x, y)$ is a moving point such that its distance from point $A(-6,5)$ is 2. Find an equation of the locus of P. Express your final answer in the form $x^2+y^2+bx+cy+d=0$ where b, c and d are real numbers.

(2 marks)

(c) Two variables x and y are related by an equation $y=\frac{a}{x}+b$

The diagram below shows a straight line obtained after plotting $Y(=xy)$ against x.



(i) Find the slope and the Y-intercept of the line.

(ii) Find the values of a and b.

(3 marks)

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